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University to the region of the Musselshell river in Montana, the writer suggested to Professor W. B. Scott the possibility of finding fossil mammals in the Fort Union beds which are so well developed in the Crazy Mountains and vicinity. It was his idea that in a country where the Laramie, Livingston and Fort Union beds occur and attain a considerable thickness, the long-sought ancestors of the placental mammals of the Puerco might be found.

In the region where the camp was established, near Fish Creek, to the eastward of the Crazy Mountains, the writer had found, during the previous year, near the top of the series of rocks so beautifully exposed in this region, many fossil deciduous leaves. Many of these were in a hard, fine-grained sandstone and were excellently preserved. Below the layers of sandstone containing the best leaves were dark or gray shales in which were carbonaceous matter, plant impressions and distorted gasteropod shells, interstratified with layers of quite hard gray sandstone, which were often ripple marked. Still lower were dark gray shales with concretions, and bands or lenses of limestone containing fresh-water Bivalves and Gasteropods. The concretions are brown (ironstones) and break in angular fragments. The shales are partly soft and fine-grained and in part sandy.

During the greater part of last summer the writer was collecting for the Princeton Museum and was with the Princeton party during their stay in this region. In August, while ascending the butte from which leaves had been procured the previous year, and examining the dark shale beneath the sandstone cap, he found fragments of a tooth, which, when put together looked like the canine tooth of a mammal. Near it a premolar was found that at once settled the matter. It appears to belong to a small species of *Pantolambda*. This level was followed and carefully searched. Several teeth of *Euprotogonia* were found and fragmentary remains of one or two more mammals, besides teeth and fragments of jaws of crocodiles. This exposure was small. Afterward on another side of the butte, ravines which exposed the shales at

about the same level were examined, and other bones and teeth were found.

These mammalian remains, which are now in the Princeton Museum, have been examined by W. B. Scott, M. S. Farr, and W. D. Matthew, as well as by the writer. One or two have been specifically determined and all agree that the beds belong to the Torrejon horizon. The fossils determined are:

Miocænus acolytus (Cope),
Anisonchus close to *A. sectorius*,
Euprotogonia,
Pantolambda (?),
Psittacotherium (?)

This is a very interesting discovery, as heretofore Torrejon mammals have been found only in a limited area in New Mexico, and the beds have been searched with the greatest care, 'on hands and knees,' with a scientific zeal to know more of the peculiar mammals of this age.

The importance and interest of the discovery are doubled by the fact that everything seems to indicate that these are the Fort Union beds, the exact position of which has been uncertain. The collection of fossil leaves that was made in the summer of 1900 has been sent for with a view to the accurate determination of the species. As the Fort Union flora is a characteristic one it is confidently believed that the plants together with the mammals will settle the position of the Fort Union formation beyond controversy.

EARL DOUGLASS.

PRINCETON, N. J.

ENGINEERING NOTES.

ECCLES, a small town in England, has introduced the automobile fire-engine. It carries five men, three hundred feet of hose and standpipes, ladders, jumping sheet, etc. It is driven by an electric motor at a speed, on a smooth and level pavement, of about fifteen miles an hour. It climbs heavy gradients and is reported to be preeminently satisfactory. The self-propelled steam fire-engine has often been built, in the United States and abroad, and has sometimes proved satisfactory, though usually too heavy. The electric machine has at least one peculiar advantage in its instant

readiness for work. No delay is compelled as in starting fires and getting up steam or in waiting for horses, and immediately the alarm is heard, the attendant can jump upon his engine and start for the fire. In large cities, with their paid fire departments where the steam fire-engines always stand with water hot and steam making, and the horses and crews ready to move out of the house in intervals measured by seconds, this is a matter of less consequence; the engine will seldom fail to start promptly and to have steam ready before reaching its position at the fire. With small places, the case is very different. There, the engine is cold, no crew at hand, the horses often in a detached stable, or even at some distance, and in many cases hand-power only available. In such places, should a source of supply be at hand for charging batteries, the electric automobile fire-engine would prove ideal.

THE advance made to date in the production of locomotives for heavy work is illustrated by the completion, recently, for the Atchison road, by the Schenectady Locomotive Works, of a ten-wheel engine weighing 275,000 pounds; while the progress of the business of locomotive construction is evidenced by the acceptance of orders by the Baldwin Works to an aggregate of seven hundred engines of all styles for the year 1902.

The *Providence Journal* owns an electric automobile, which has been working since the early autumn. It has traversed 1,000 miles and is expected to make the record 1,500 or 1,800 before its batteries will require replacement. The normal output is 22 amperes; but it has risen to 80 when ascending the hill to Brown University from Market Square. It has shown the practicability of rising a 10 per cent. gradient, although at serious cost in life of battery. It is estimated by the *Journal* that the cost is about that of keeping a single horse and carriage.

R. H. T.

BOTANICAL NOTES.

THE 'BROWN DISEASE' OF POTATOES.

For several years the potato crop of Nebraska has been seriously damaged by a disease

which causes the fibro-vascular bundles to turn brown. This disease appears to be widely distributed in both America and Europe, but as yet nothing satisfactory has been published in this country concerning the cause of the trouble. About the first of March, 1901, Mr. J. A. Warren, now of the Santee Normal Training School, began a series of experiments in the botanical laboratories of the University of Nebraska in order to determine if possible what produced the disease. He now reports as follows: "My first cultures soon showed tufts of mould filaments projecting from the diseased bundles, and in a few days there were many ripe fruits of *Stysanus stemonites* (Pers.) Corda. I repeated the experiment many times, using both affected and unaffected tubers from different fields. In nearly every case the cultures containing brown bundles produced *Stysanus*, while those containing no brown bundles produced no *Stysanus*. Tubers grown at Lincoln, Harvard, Humboldt and Santee, Nebraska, and Cedar, Minnesota, were used, always with the same results. These experiments have now been continued for about eight months, and I hope to follow them the coming season. The results seem to show that *Stysanus stemonites* is the cause of the disease."

The importance of this discovery lies in the fact that this appears to be the first record which connects *Stysanus stemonites* with this disease in this country, as well as the first record of its occurrence.

MORE ON THE PHILIPPINE FLORA.

THE Forestry Bureau of the Philippine Islands has issued a sixteen page pamphlet on the 'Tree Species,' giving the scientific and common names, the families and a little information in regard to the usefulness of the trees in the industries. No less than sixty-one families are represented, and the whole number of species enumerated is six hundred and twenty-two. The larger families are Urticaceae, with 45 species; Leguminosae, 42; Euphorbiaceae, 30; Myrtaceae, 28; Rubiaceae, 28; Sapotaceae, 24; and Lauraceae, 22. Of the Cupuliferae there are 13 species, two of which are species of *Castanopsis*, the remainder being